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species distributed among eight genera. The vascular system of the primary root and hypocotyl is typically tetrarch and corresponds with two bundles from each cotyledon without change of position. In some species the root is hexarch; in others, variable and anomalous. The occurrence of the hexarch type led the author to suspect that a central cotyledonary trace, such as is found in some species of Diospyros, had aborted, but no sign of this could be found. In *Bumelia tenax* the root is usually hexarch. In the upper part of the root and the hypocotyl, four of these bundles differ from the other two in that from them alone rise the lateral rootlets, and also in that they alone are continuous with the bundles of the cotyledons.—W. J. G. LAND.

Fungus excreta.—A condition almost like that in successive cultures of the higher plants is reported for certain fungi by LUTZ.[28] He finds that in nutritive solutions in which various molds (Aspergillus, Botrytis, Cladosporium, Fusarium, Mucor, Penicillium) have been grown, there are produced substances which retard or accelerate the germination and growth of the same or other species. These products have much in common with enzymes; they are destroyed by high temperatures (80–100° C.); their action is weakened by dilution, ceasing usually at about 20-fold; they are destroyed in sunlight (20 hours), the violet rays being most efficient. Some of these substances may be stopped by a clay filter, but some pass through. The agents which accelerate growth and development are formed in lighted cultures, especially those of Fusarium and Aspergillus.—C. R. B.

Chemotropism of fungi.—As part of the larger subject, parasitism, SCHMIDT has investigated the chemotropism of an unknown species of Phyllosticta, parasitic on pear leaves.[29] He is apparently ignorant of FULTON'S work on this subject,[30] and with experimentation that is open to serious objection, comes to the conclusion that this plant is positively chemotropic. Its chemotropism, however, is not supposed to come into play at once, "but the fungus itself must first, by enzymatic, toxic, or purely mechanical means, so alter the normal structure of the epidermal cell as to set free a diffusion stream, counter to which, as a directive stimulus, the further growth of the fungus proceeds." This view he promises to support in a second paper.—C. R. B.

Culture solutions.—Any who are interested in water-cultures should consult a recent paper by BENECKE,[31] who has been testing the efficiency of VON DER CRONE'S solution, in comparison with the older ones. VON DER CRONE proposed in 1904 a solution nearly like SACHS'S, except in the addition of the iron as ferrous

[28] LUTZ, OTTO, Ueber den Einfluss gebrauchter Nährlösungen auf die Keimung und Entwicklung einiger Schimmelpilze. Ann. Mycol. **7**:91–133. 1909.

[29] SCHMIDT, E. W., Ueber den Parasitismus der Pilze. Zeit. Pflkrankh. **19**:129–143. *figs.* 7. 1908.

[30] BOT. GAZETTE **41**:81–108. 1906.

[31] BENECKE, W., Die von der Cronesche Nährsalzlösung. Zeits. Bot. **1**:235–252. 1909.

phosphate, $Fe_3(PO_4)_2$, instead of the traces of iron which are usually added to the Sachs solution as Fe_2Cl_6. It differs from PFEFFER'S and MAYER'S essentially in the use of tricalcium phosphate, $Ca_3(PO_4)_2$, instead of potassium phosphate, thus avoiding the acidity of these solutions. BENECKE has tested VON DER CRONE'S claims, some of which he finds justified, others not. The details are not of general interest.—C. R. B.

Prochromogens.—In further development of our knowledge of plant chromogens, PALLADIN[32] has found that these substances are not present in any considerable amounts at any time, but that they are formed gradually, from what he proposes to call prochromogens, which there is some ground for thinking are glucosides. These are split up by enzymes and the chromogens are produced in small amounts, except in the spring, when larger amounts may be observed. In dead plants the enzymes give rise to large amounts of the chromogens, because the splitting is then uncoordinated, and the oxidation of these leads to the observed blackening of the tissues.—C. R. B.

Light perception.—Besides the ocelli (in the sense of HABERLANDT), SCHÜRHOFF describes[33] apparatus in six species of Peperomia which may function in the perception of light, namely: the funnelform palisade cells, by reflecting the light to the chloroplasts at their base; the upper convex wall of the palisades, by acting as a lens; and the cluster crystals, that disperse to all the chloroplasts the light focused by the lenticular upper portion of the cell. These ideas seem even more strained than the theory they are adduced to support.—C. R. B.

Wetting of leaves.—AWANO[34] furnishes the ecologists a considerable body of statistics regarding the wetability (there ought to be such a word, if there is not) of leaves. Out of 264 plants examined as to this point, he finds 164, about $\frac{2}{3}$, wetable with difficulty or not at all, while the rest are easily wetable. Leaves of most strand and sand plants are hardly wetable, while those of shade plants and ferns are easily wetable. The details, presented in extensive tables, are combined with observations on the number and distribution of stomata.—C. R. B.

Extrafloral nectaries.—SALISBURY has described[35] the extrafloral nectaries of eight species of the genus Polygonum. He ascribes the secretory action to osmotic pressure of the gland cells, independent of root pressure, and thinks that the nectar glands, which are especially striking in tropical plants, represent originally hydatodes, which have in some cases later acquired a biological significance. He

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[32] PALLADIN, W., Ueber Protochromogene der pflanzlichen Atmungschromogene. Ber. Deutsch. Bot. Gesells. **27**: 101–106. 1909.

[33] SCHÜRHOFF, P., Ozellen und Lichtkondensoren bei einigen Peperomien. Beih. Bot. Centralbl. **23**: 14–26. *pls. 3, 4.* 1908.

[34] AWANO, S., Ueber die Benetzbarkeit der Blätter. Jour. Coll. Sci. Imp. Univ. Tokyo **27**: 1–49. 1909.

[35] SALISBURY, E. J., The extrafloral nectaries of the genus Polygonum. Annals of Botany **23**: 229–242. *pl. 16. figs. 6.* 1909.